

AMENDMENTS TO THE DRAWINGS:

The Office Action objected to the drawings for being informal and asserted that FIGS. 1-4, 6A, 6B and 7 should be designated as --Prior Art--. Accordingly, eight (8) formal replacement sheets are being submitted herewith. In the replacement sheets, FIGS. 1-4, 6A, 6B and 7 have been labeled as --Prior Art--.

For at least the foregoing reasons, withdrawal of the objection to the drawings is respectfully requested.

REMARKS

The Applicant has now had the opportunity to carefully consider the remarks set forth in the Office Action mailed December 14, 2005. All of the rejections are respectfully traversed. Amendment, reexamination and reconsideration are respectfully requested.

The Office Action

In the Office Action mailed December 14, 2005:

claims 6 and 9 were rejected under 35 U.S.C. 112 for including the phrase "may or may not"; and

claims 1-14 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0005388 by Fukumasa ("Fukumasa").

The Notice of References Cited Appears to be Incomplete

Under the subheading **Conclusion**, page 6 of the Detailed Office Action makes reference to U.S. Patent Application Publication No. 2002/0162074 by Bickerstaff. However, U.S. Patent Application Publication No. 2002/0162074 was not included on the Notice of References Cited associated with the Office Action. Additionally, the Applicant has reviewed the record and has found no indication that U.S. Patent Application Publication No. 2002/0162074 was submitted by the Applicant or cited by the Examiner previously. Therefore, correction of the Notice of References Cited is respectfully requested.

The Present Application

By way of brief review, the present application is directed toward a decoder including a soft input/soft output architecture that implements an in-place addressing technique (e.g., paragraphs 18-38, page 8, lines 6 – page 11, line 23) which allows the single SISO architecture to handle any convolutional code associated with any number of trellis states. That is, the claimed decoder can implement any radix turbo code having 2^{K-1} number of states for any K. As a result, a decoder including a single SISO of the disclosed and claimed architecture can act as an inner SISO of a serial concatenated convolution coding (SCCC) at a first point in a decoding process and act as an outer SISO of the SCCC in a second point in a decoding process. Additionally, the flexibility provided by the in-place addressing technique allows the device to process

data according to a first trellis size when operating as the inner SISO and according to a second trellis size when operating as the outer SISO. Furthermore, the single SISO may operate as a first SISO of a parallel concatenated convolution code (PCCC) decoder at a first point in a parallel decoding process and as a second SISO of the PCCC decoder at a second point in the decoding process (e.g., paragraph 58, page 15, line 26 – page 16, line 8).

The Cited Reference

In stark contrast, the cited reference by Fukumasa does not disclose or suggest in-place addressing or disclose or suggest a single SISO capable of performing the operation of both an inner and outer SISO in processing associated with an SCCC or to act as a first and second SISO at various points in processing of a PCCC. Indeed, the decoder of Fukumasa comprises a plurality of decoding and encoding portions (e.g., claim 2, line 11; claim 1, line 11).

The Claims Meet the Requirement of 35 U.S.C. 112

Claims 6 and 9 were rejected under 35 U.S.C. 112 for including the phrase “may or may not”.

However, with regard to **claim 6**, it is respectfully submitted that the phrase --may or may not-- is not indefinite. Instead, it is respectfully submitted that the phrase --may or may not-- makes it clear that even though N_1 and N_2 have different names or subscripts, they may have equal values. Furthermore, the phrase --may or may not-- makes it clear that N_1 and N_2 can have different values. It is respectfully submitted that without the phrase --may or may not-- the use of different names (N_1 and N_2) may be wrongly construed to imply that the values they represent are different and this is not necessarily the case.

For at least these reasons, it is respectfully submitted that **claim 6** meets the requirements of 35 U.S.C. 112.

The Applicant has carefully reviewed **claim 9** and has been unable to find any occurrence of the phrase “may or may not”. Instead, it appears that the Office may have meant to refer to the phrase “may not be equal to”.

In this regard, **claim 9** has been amended and now recites -- N_1 is equal to N_2 --.

For at least these reasons, it is respectfully submitted that **claim 9** meets the

requirements of 35 U.S.C. 112.

The Claims are not Anticipated

Claims 1-14 were rejected under 35 U.S.C. 102(e) as being anticipated by Fukumasa.

Claim 1 has been amended to recite a decoder comprising an SISO device that operates as a PCCC decoder in a first mode of operation and as an SCCC decoder in a second mode of operation wherein the device operates as per at least one trellis using an in-place addressing technique to process information.

In support of the assertion that Fukumasa discloses the subject matter of **claim 1**, the Office Action directs the attention of the Applicant to claim 2, lines 4 -10, and reference numerals 21 and 24A in FIG. 6 of Fukumasa.

However, lines 4-10 of claim 2 of Fukumasa are part of a preamble explanation regarding a source of information to be decoded by the decoder of Fukumasa. Specifically, the preamble of Fukumasa indicates that the decoder of Fukumasa is included in a receiving device that "receives transmitted signals of encoded signals with parity signals which each have been produced by convolutionally **encoding** an information signal using a concatenated convolution **encoder** having a first convolutional **encoder** and second convolutional **encoder** for implementing conventional **encoding**, connected in parallel or series with an interleaver interposed therebetween for rearranging input data based on a predetermined rule."

The next few lines of the claim indicate that the claimed decoder comprises a plurality of decoding and encoding portions.

It is respectfully submitted that the reference to parallel or in series at lines 7 and 8 of claim 2 is part of a description of the **encoder** from which data might be received for processing by the claimed decoder.

In this regard, it is respectfully submitted that claim 2, lines 4-10, do not disclose or suggest an SISO device that operates as a PCCC decoder in a first mode of operation and as an SCCC decoder in a second mode of operation. Furthermore, claim 2, lines 4-10, of Fukumasa do not even disclose or suggest an element of an encoder that can operate in parallel or in series. Instead, the preamble of claim 2 simply indicates that the data decoded by the claimed decoder can be from an encoder that is of a parallel or a serial architecture.

Furthermore, it is respectfully submitted that nothing in claim 2, lines 4-10, discloses or suggests an **in-place addressing technique** (e.g., see paragraphs 18-38, page 8, line 6 - page 11, line 23 of the present application). Reference characters 21 and 24A of FIG. 6 of Fukumasa identify an interleaver and a deinterleaver, respectively. It is respectfully submitted that nothing in the depiction of the interleaver 21 and deinterleaver 24A of FIG. 6 of Fukumas discloses or suggests an SISO device that operates as a PCCC decoder in a first mode of operation and as an SCCC decoder in a second mode of operation. Furthermore, nothing in the depiction of interleaver 21 and deinterleaver 24A discloses or suggests and SISO device that operates as per at least one trellis using an in-place addressing technique (e.g., see paragraphs 18-38 of the present application).

Furthermore, even if the soft decision decoders (reference numerals 20 and 23 of FIG. 6 of Fukumasa) are considered to be analogous to SISO devices, it is respectfully submitted that Fukumasa does not disclose or suggest that either device (20, 23) is capable of operating as a PCCC decoder in a first mode of operation and as an SCCC decoder in a second mode of operation or that either device operates as per at least one trellis using an in-place addressing technique (e.g., see paragraphs 18-38).

For at least the foregoing reasons, it is respectfully submitted that **claim 1**, as well as **claims 2-11**, which depend therefrom, is not anticipated and is not obvious in light of Fukumasa.

Additionally, **claim 4** has been amended to recite the decoder of claim 1 where in the first mode of operation the SISO device operates as a first SISO during one time period and in the second mode of operation operates as a second SISO device during a second time period where the first and second SISO devices process information as per the same or different trellis.

In support of the assertion that Fukumasa discloses the subject matter of the unamended version of **claim 4**, the Office Action directs the attention of the Applicant to paragraph 35 of Fukumasa.

However, paragraph 35 summarizes a ninth aspect of the invention of Fukumasa. Paragraph 35 discusses a first soft-decision decoder and a second soft-decision decoder. However, paragraph 35 does not disclose or suggest an SISO device that operates as a first SISO and also operates as a second SISO as recited in original **claim 4**. Furthermore, it is respectfully submitted that paragraph 35 does not

disclose or suggest an SISO device that operates in a first mode of operation as a first SISO during one time period and in a second mode of operation operates as a second SISO device during a second time period. Moreover, paragraph 35 does not disclose or suggest an SISO device operating as first and second SISO devices wherein the first and second SISO devices process information as per the same or different trellis.

For at least the foregoing additional reasons, **claim 4** is not anticipated and is not obvious in light of Fukumasa.

Claim 5 was rejected for the same reason as **claim 4**. In this regard, arguments similar to those submitted in support of **claim 4** are submitted in support of **claim 5**. Paragraph 35 of Fukumasa discusses two separate devices, a first soft-decision decoder and a second soft-decision decoder. Paragraph 35 does not disclose or suggest a single SISO device that operates as an inner SISO during one time period and as an outer SISO during another time period. Moreover, paragraph 35 of Fukumasa does not disclose or suggest a single SISO device that processes information as per a first trellis during one time period and processes information as per a second trellis during another time period.

For at least the foregoing additional reasons, **claim 5** is not anticipated and is not obvious in light of Fukumasa.

Claim 6 depends from **claim 5** and is patentably distinct for at least that reason.

Additionally, **claim 6** was rejected for the same reasons as **claim 3**. In explaining the reasons for rejecting **claim 3**, the Office Action directs the attention of the Applicant to paragraphs 10 and 18 of Fukumasa.

However, paragraph 10 discusses Maximum A Posteriori Probability decoding and provides equations therefor and does not disclose or suggest a decoder of **claim 5** where the first trellis is an N_1 -state radix K trellis and the second trellis is an N_2 -state radix K trellis where N_1 may or may not be equal N_2 and K, N_1 and N_2 are integers equal to 1 or greater.

Paragraph 18 discusses serially concatenated convolution codes and soft-input soft output decoders. However, it is respectfully submitted that paragraph 18 does not disclose or suggest the decoder of **claim 5** where the first trellis is an N_1 -state radix K trellis and the second trellis is an N_2 -state radix K trellis where N_1 may or may not be equal N_2 and K, N_1 and N_2 are integers equal to 1 or greater.

For at least the foregoing additional reasons, **claim 6** is not anticipated and is not

obvious in light of Fukumasa.

Claim 7 was rejected for the same reasons as **claim 3**. However, **claim 7** recites *inter alia* at least one Log Likelihood ratio output whereby the path metric calculators and the at least one Log Likelihood calculator are constructed with Log Sum operators which are designed based on **an approximation** of a Jacobian definition of a Log Sum operation. It is respectfully submitted that paragraphs 10 and 18 of Fukumasa do not disclose or suggest at least one Log Likelihood ratio output whereby the path metric calculators and the at least one Log Likelihood calculator are constructed with Log Sum operators which are designed based on **an approximation** of a Jacobian definition of a Log Sum operation.

For at least the foregoing additional reasons, **claim 7** is not anticipated and is not obvious in light of Fukumasa.

Claim 8 was rejected for the same reasons as **claim 3**.

However, **claim 8** depends from **claim 7** and is not anticipated and not obvious for at least that reason.

Additionally, **claim 8** recites language related to an N_1 -state radix K first trellis and an N_2 -state radix K second trellis when operating as an SCCC turbo decoder. In this regard, arguments similar to those submitted in support of **claim 6** are submitted in support of **claim 8**.

For at least the foregoing additional reasons, **claim 8** is not anticipated and is not obvious in light of Fukumasa.

Claim 9 was rejected for the same reasons as **claim 3**.

However, **claim 9** depends from **claim** and is not anticipated and is not obvious for at least that reason.

Additionally, **claim 9** has been amended to recite where the SISO device is operating as a PCCC decoder and N_1 is equal to N_2 and K is an integer equal to 4 or greater and N_1 , N_2 are integers equal to 2 or greater.

It is respectfully submitted that paragraphs 10 and 18 of Fukumasa do not disclose or suggest the details recited in **claim 9**.

For at least the foregoing additional reasons, **claim 9** is not anticipated and is not obvious in light of Fukumasa.

In explaining the rejections of **claims 10** and **11**, the Office Action directs the attention of the Applicant to any of FIGS. 2, 4 or 5 of Fukumasa.

However, **claims 10 and 11** have been amended to replace the reference to in-line addressing with in-place addressing. In this regard, arguments similar to those submitted in support of **claim 1** are submitted in support of **claims 10 and 11** which recite additional detail related to in-place addressing. Fukumasa does not disclose or suggest in-place addressing (e.g., see paragraphs 18-38, pages 8-11, of the present application). It is respectfully submitted that FIGS. 2, 4 and 5 of Fukumasa do not disclose or suggest the in-place addressing described in the present application and recited in **claims 10 and 11**.

Claims 12-24 were rejected for the same reasons as **claim 3**. In this regard, arguments similar to those submitted in support of **claim 6-9** are submitted in support of **claims 12-14**. Paragraphs 10 and 18 of Fukumasa do not disclose or suggest the details relative to N state K trellis processing recited in **claims 12-14**.

Additionally, arguments similar to those submitted in support of **claim 1** are submitted in support of **claims 12-14**. **Claims 12-14** have been amended to replace the phrase --in-line addressing-- with the phrase --in-place addressing--. Fukumasa does not disclose or suggest in-place addressing (see paragraphs 18-38, pages 8-11, of the present application).

For at least the foregoing reasons, **claim 12**, as well as **claims 13 and 14**, which depend therefrom, is not anticipated and is not obvious in light of Fukumasa.

New **claim 15** recites a decoder including an interleaver, deinterleaver and a soft-input soft-output device. The soft-input soft-output device processes path metric data according to the in-place addressing technique and a number of details associated therewith are recited in the recitation associated with the soft-input soft-output device.

It is respectfully submitted that support for new **claim 15** is found throughout the specification including, for example, paragraphs 18-38 and paragraphs 20-28, in particular. It is respectfully submitted that Fukumasa does not disclose or suggest the subject matter recited in new **claim 15**.

Telephone Interview

In the interests of advancing this application to issue the Applicant(s) respectfully request that the Examiner telephone the undersigned to discuss the foregoing or any suggestions that the Examiner may have to place the case in condition for allowance.

CONCLUSION

Claims 1-14 remain in the application. **Claim 15** has been added. **Claims 1-14** have been amended to correct antecedence and for other reasons. It is respectfully submitted that the amendments to the claims should not require a new search. For at least the foregoing reasons, the application is in condition for allowance. Accordingly, an early indication thereof is respectfully requested.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & McKEE, LLP

March 14, 2006
Date


Joseph D. Dreher, Reg. No. 37,123
Thomas Tillander, Reg. No. 47,334
1100 Superior Avenue
Seventh Floor
Cleveland, Ohio 44114-2579
216-861-5582

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